SAT Report

PMN Number: **P-12-0264**
SAT Date: **4/6/2012**
Print Date: **8/19/2014**

Related cases: [redacted]

Concern levels:

Type of Concern:	**Health**	**Eco**	**Comments**
Level of Concern:	1-2	2	

Persistence	**Bioaccum**	**Toxicity**	**Comments**
1	1	1 Awaiting Human Health Entry Awaiting Human Health Entry Awaiting Human Health Entry	

Exposure Based Review:

Health: No
Ecotox: Yes

Routes of exposure:

Health: Inhalation
Ecotox: All releases to water
Fate: ;

Keywords:

Keywords:

Summary of Assessment:

Fate:

Fate Summary: P-12-0264

FATE:
Liquid with MP < 25 C (E)
S = Dispersible (E)

VP < 1.0E-6 torr at 25 C (E)
BP > 400 C (E)
H < 1.00E-8 (E)
POTW removal (%) = 50-90 via sorption
Time for complete ultimate aerobic biodeg = wk
Sorption to soils/sediments = strong
PBT Potential: P1B1
*CEB FATE: Migration to ground water = slow

Health:

Health Summary: Not absorbed through the skin, poor absorption from the GI tract and the lung (analog). Concern for [redacted] effects on the lung; irritation to eye, mucous membranes and lung based on [redacted] properties of the compounds.

Ecotox:

Test Organism	Test Type	Test End Point	Predicted	Measured	Comments
fish	**96-h**	**LC50**	4.7	>14	
daphnid	**48-h**	**LC50**	≤5.0	2.2	
green algal	**96-h**	**EC50**	≤5.0		
fish	**_**	**chronic value**	0.50		
daphnid	**_**	**chronic value**	≤0.50	0.22	ACR10
algal	**_**	**chronic value**	≤0.50		
Sewage Sludge	**3-h**	**EC50**	**_**		
Sewage Sludge	**_**	**Chronic Value**	**_**		

Ecotox Values Comments:

Factors	Values	Comments
Assessment Factor	10	
Concentration of Concern (ppb)	22	
SARs	[redacted]	
SAR Class	[redacted]	
Ecotox Category		

Ecotox Factors Comments:

SAT Chair: LKeifer 564-8916

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Focus Report

New Chemicals Program

PMN Number: **P-12-0264**

Focus Date:	04/18/2012 11:00:00 PM	Report Status:	Completed
Consolidated Set:			
Focus Chair:	Jeff Bauer	Contractor:	Jessica Baxter

I. Notice Information

Submitter:	Akzo Nobel Surface Chemistry LLC	CAS Number:	164118-71-2
Chemical Name:	1-Propanamimium, 2-hydroxy-N,N-dimethyl-N-[3-[[(13Z)-1-oxo-13-docosen-1-yl]amino]propyl]-3-sulfo-, inner salt		

Use: [redacted]. P2REC-DR: CRSS: drop (not verifiable). P2 Claim: [redacted]

Other Uses: [redacted]

PV-Max:

Manufacture: Import: X

II. SAT Results

(1) **Health Rating:** 1-2 **Eco Rating:** 2 **Comments:** ;

Occupational: 0-1 **Non-Occupational:** **Environmental:** NR

(1) **PBT:** 1 1 1 **Comments:**

III. OTHER FACTORS

Categories:

Health Chemical Category: Ecotox Category: amphoteric surfactants

Related Cases/Regulatory History:

Health related Cases:

Ecotox Related Cases: [redacted]

Regulatory History:

[redacted] - PENDING A NON-5(e) SNUR/LTTR SENT
[redacted] - PENDING TESTING
[redacted] - GRANTED
[redacted] - WITHDRAWN - OTHER
[redacted] - WITHDRAWN/FACE 5E
[redacted] - FOCUS DROP
[redacted] - TR 2ND DISPOSITION DROP
[redacted] - PENDING A NON-5(e) SNUR/LTTR SENT
[redacted] - REG NON 5E SNUR
[redacted] - REG NON 5E SNUR
[redacted] - WITHDRAWN - OTHER

MSDS/Label Information:

MSDS:	Yes	Label:	No
General Equipment:	Splash goggles, lab coat, neoprene or nitrile rubber gloves, & suitable protective footwear.		
Respirator:	Wear appropriate respirator when ventilation is inadequate.		
Health Effects:	May cause eye and skin irritation.		
TLV/PEL (PMN or raw material):	- None established		

Exposure Based Information:

Exposure Based Review:	Y	Exposure Based Review (Health):	N
Exposure Based Review (Eco):	Y	Exposure Based (Occupational):	No
Exposure Based Review (Non Occupatuional):	N	Exposure Based (Environmental):	

Exposure Parameter	Exposure-Based	Persistent/Bioaccum	Exposure Value
Surface DW:		Yes	
Fish Ingestion:			
Ground DW:			0
Inhalation:			0
Water Releases:			0
Total Releases:	Yes		[redacted]
Consumer Exposure:	Yes		

IV. Summary of SAT Assessment

Fate:

Fate Summary:

P-12-0264
FATE:
Liquid with MP < 25 C (E)
S = Dispersible (E)
VP < 1.0E-6 torr at 25 C (E)
BP > 400 C (E)
H < 1.00E-8 (E)
POTW removal (%) = 50-90 via sorption
Time for complete ultimate aerobic biodeg = wk
Sorption to soils/sediments = strong
PBT Potential: P1B1
*CEB FATE: Migration to ground water = slow

Health:

Health Summary: Not absorbed through the skin, poor absorption from the GI tract and the lung (analog). Concern for surfactant effects on the lung; irritation to eye, mucous membranes and lung based on surfactant properties of the compounds.

Ecotox:

Ecotox Values:

Fish 96-h LC50:	4.7(P)	>14(M)
Daphnid 48-h LC50:	≤5.0(P)	2.2(M)
Green algal 96-h EC50:	≤5.0(P)	
Fish Chronic Value:	0.50(P)	
Daphnid ChV:	≤0.50(P)	0.22(M)
Algal ChV:	≤0.50(P)	

Ecotox values comments: Predictions are based on SAR-nearest analog method for amphoteric surfactants; SAR chemical class = surfactant-amphoteric-C21-N-SO3; MW 561; pH7; effective concentrations based on 100% active ingredients and mean measured concentrations; hardness <180.0 mg/L as CaCO3; and TOC <2.0 mg/L;

Ecotoxicity Test Data Results
P-12-0264: 1-Propanamimium,
2-hydroxy-N,N-dimethyl-N-[3-[[(13Z)-1-oxo-13-docosen-1-yl]amnio]propyl]-3sulfo-,inner salt

(CASRN: 164118-71-2; Trade name: Armovis EHS).

Aquatic freshwater fish, aquatic freshwater invertebrate and freshwater and marine algae toxicity studies conducted on P-12-0264 were completed in 2011 by NOTOX B.V or Akzo Nobel N.V. Laboratories for Akzo Nobel Surface Chemistry LLC. P-12-0264 was classified by EPA as an amphoteric surfactant, but based on the submitter provided structure the substance appears to be a reaction product as well. P-12-0264 is also identified by the submitter as a viscoelastic surfactants (VES) that forms "worm-like micelles in solution", which precludes the need for a water solubility value. Studies reportedly followed the respective guidelines of OPPTS 850.1075 (Fish Acute Toxicity Test, Freshwater and marine), OPPTS 850.1010 (Aquatic Invertebrate Acute Toxicity Test, Freshwater Daphids) or OECD 202 (Daphnia sp., acute immobilisation test.), and OPPTS 850.5400 (Algal Toxicity Tiers I and II) or OECD 201 (Freshwater alga and cyanobacteria, Growth Inhibition Test) and were GLP compliant except for the marine diatom study; deficiencies in the studies are reported below.

(1) A 96-hour fish acute toxicity study was conducted with Armovis EHS (45% P-12-0264, ~21% ethanol, 15.3% water, ~12% propylene glycol, 4.4% sodium chloride, 2.2% CHOPSNa [CAS# 126-83-0], 1.1% fee amine, and 0.4% amine hydrochloride) under static-renewal testing conditions using 48-hour renewal. Prior to initiation of the definitive test, a range-finding study was conducted in which two replicates of 3 Cyprinus carpio per concentration were exposed to nominal concentrations of 0 (dilution water control), 10, or 100 mg/L. Analytical monitoring of test concentrations during a single renewal period showed that 93-104% and 65-86% of nominal concentrations were maintained for the 10 and 100 mg/L test concentrations. In the definitive test, two replicates of seven C. carpio per concentration were exposed to nominal concentrations of 0 (dilution water control) or 100 mg/L P-12-0264, which corresponded to mean measured concentrations of 0 and 14 mg/L P-12-0264. The submitter was unsure of the reason for the noticeable loss of test substance compared to the range-finding study, but thought it might have something to do with the larger test system. Test concentrations were determined analytically using Acquity UPLC system. Test solution preparations involved a magnetic stirring for 1 hour at the highest test concentration (100 mg/L) in combination with ultrasonic treatment to homogeneously disperse the test substance in the test medium. The lower test concentrations for the range-finding test were prepared by subsequent dilutions of the highest test concentration in test medium whilst stirring. The final test solutions were increasingly hazy and contained white precipitate, which suggested the test substance may have settled out of solution. In the definitive study mean fish weight and length were 1.01 g and 3.4 cm, respectively, and resulted in a fish loading of 0.35 g fish/L. Over the course of the study, water temperature ranged from 21.1 – 22.2 °C, pH ranged from 7.6 – 7.8, and the dissolved oxygen concentrations ranged from 8.0 – 9.2 mg/L. Dilution water hardness was 44 mg CaCO3/L and dilution water TOC was 0.4 mg/L. A fish loading of 0.182 g fish/L was calculated. No adverse effects were reported in exposed fish from both the range-finding and the definitive test. The LC50 was reported as 14 mg/L. Although the submitter did not maintain test concentrations to the degree necessary to substantiate static renewal testing with 48-hour renewal periods, no effects were consistently observed up to measured concentrations of 65.2-86.4 mg/L and 14 mg/L for the range-finding and definitive test, respectively, and, thus, acute fish toxicity endpoint was considered to be adequately characterized.
96-hr LC50 > 14 mg/L

(2) A 48-hour daphnid acute toxicity study was conducted with Armovis EHS (45% P-12-0264, ~21% ethanol, 15.3% water, ~12% propylene glycol, 4.4% sodium chloride, 2.2% CHOPSNa [CAS# 126-83-0], 1.1% fee amine, and 0.4% amine hydrochloride) under static testing conditions. Four replicates of five Daphnia magna (< 24 hours old) per concentration were exposed to nominal concentrations of 0 (dilution water control), 0.625, 1.25, 2.5, 5, or 10 mg/L Armovis EHS. Corresponding mean measured concentrations were 0, 0.25, 0.62, 1.4, 3.2, and 7.2 mg/L using High Performance Liquid Chromatography combined with mass spectrometry (LC-MS/MS).The main component (P-12-0264) was analyzed during the experiment. The stock solution of 43.3 mg/L test substance (initial measured concentration) appeared slightly turbid but homogeneous; appearance of test solutions was not provided. Daphnid loading was 100 daphnid/L, which is considered to be high and might result in crowding. Over the course of the study, water temperature ranged from 20.25 – 21.65 °C, pH ranged from 7.9 – 8.1, and the dissolved oxygen concentrations ranged from 8.1 – 8.6 mg/L. Dilution water hardness was 240-276 mg CaCO3/L, which is high by OPPTS standards. Observed daphnid immobility was 0% (0/20), 0% (0/20), 20% (4/20), 25% (5/20), 75% (15/20), and 80% (16/20) at concentrations of 0 (dilution water and

solvent controls), 0.25, 0.62, 1.4, 3.2, and 7.2 mg/L, respectively. The submitter notes a visible difficulty the daphnid had swimming and speculates that test substance may bind to daphnid. EPA considers lethargy to also be a rational cause for this so-called difficulty swimming and since physical effects appeared to be limited to this lethargy and the appearance of the test solution were not provided, considers the submitters assertion insufficiently supported. The submitter notes that the 48-hour EC50 was 3.5 mg/L using the Trimmed Spearmen Karber method, which appears questionable since 75% immobilization was observed at 3.2 mg/L. Also, this effect level may be based on nominal test concentrations considering comments made in the statistical report even though the submitter claims they indicated use of measured concentrations. Using probit analysis, EPA calculated a 48-hour EC50 of 2.2 mg/L using mean measured concentrations, which appears more in line with the observed effects. The study was acceptable even though water hardness was high and could have potentially mitigated effects.
48-hr EC50 = 2.2 mg/L

(3) A 48-hour daphnid acute toxicity study was conducted with Armovis EHS (45% P-12-0264, ~21% ethanol, 15.3% water, ~12% propylene glycol, 4.4% sodium chloride, 2.2% CHOPSNa [CAS# 126-83-0], 1.1% fee amine, and 0.4% amine hydrochloride) under static testing conditions. Eight replicates of five D. magna (< 24 hours old) per concentration were exposed to nominal concentrations of 0 (dilution water control) or 100 mg/L Armovis EHS prepared as a water accommodated fraction. Analysis with LC-MS/MS methods of the 100 mg/L WAF exposure group resulted in a mean measured concentration of 1.08 mg/L. Given the nature of the test substance as a surfactant, the submitter incorrectly attributes this low measured concentration to a limit of water solubility. Based on comparison to the first daphnid study, the low concentration may be attributed to insufficient mixing, insufficient preparation of the test system, and/or settling out of the dispersion. Daphnid loading was 100 daphnid/L, which is considered to be high and might result in crowding. Appearance of the test solution was not provided. Over the course of the study, water temperature ranged from 19.7-20.4 °C, pH ranged from 7.9 – 8.1, and the dissolved oxygen concentrations ranged from 8.6 – 9.1 mg/L. Dilution water hardness was 237 mg CaCO3/L, which is high by OPPTS standards. A single daphnid was considered immobile at the only test concentration, 1.08 mg/L. The 48-hour EC50 was > 1.08 mg/L. Study methods were acceptable except for a high water hardness and daphnid loading, but the submitter did not test to a high enough concentration.
48-hr EC50 > 1.08 mg/L

(4) A 96-hour algal toxicity study was conducted with Armovis EHS (45% P-12-0264, ~21% ethanol, 15.3% water, ~12% propylene glycol, 4.4% sodium chloride, 2.2% CHOPSNa {CAS# 126-83-0], 1.1% fee amine, and 0.4% amine hydrochloride) under static testing conditions. Replicates of Pseudokirchneriella subcapitata per concentration were exposed to nominal concentrations of 0 (dilution water control), 10, 32, 102.4, 327, or 1048.5 mg/L Armovis EHS. Corresponding measured concentrations were approximately 7.65, 25.85, 89.17, 266, and 1036.75 mg/L, with exclusion of abnormal (red) or absent concentrations from the two highest test concentrations. Test concentrations were determined analytically using GC-MS method that analyzed what was considered to be the major component (P-12-0264). Six replicates were tested for each control and three replicates were tested for each test concentration. The submitter calculates effect levels based on nominal concentrations and indicates this is acceptable due to proven stability of the test substance; however, this is contrary to EPA practices. Furthermore, EPA considers effects calculated for both biomass and growth rate. The absence of the range-finding test results makes it difficult to determine why the submitter tested so high when biomass was significantly different from controls at every test concentration. The submitter uses absorbance to determine cell density, which appears to indicate increasing cell density at study initiation when density is supposed to be the same for all replicates. Since the submitter indicated that initial cell density was to be 1 x 104 cells/mL and since the submitter identifies turbidity as a confounding factor of absorbance, EPA believes absorbance methods may be unacceptable when solutions such as this are turbid. This is iterated in the submitted marine diatom study were cell counts were done at study termination due to concerns with turbid test solution. EPA could not replicate the submitters results when evaluating raw data and calculation methods (Annex 2) used by the submitter. One major issue observed was that use of the calibration curve provided in the study report results in a negative cell density for many replicates, which makes the applicability of the calibration curve questionable. Using the recommended OECD 201 (2006) calculations for growth rate and yield calculations and adjusting cell density based on the calculated cell density in controls at test initiation, effects at the highest test concentration (1036.75 mg/L) were 98% growth

rate inhibition and 48% yield inhibition. This contrast from the submitter provided results may be a consequence of the submitter accounting for the turbidity of the test substance when carrying out their calculations, but EPA could not replicate the results and felt that the submitter should not have needed to adjust if they had taken into consideration the nature of the test substance when deciding their method for cell density determination. Over the course of the study, water temperature ranged from 21-22°C, which was considered acceptable. At test initiation, the pH range of 8.2 to 8.3 was considered slightly high and may have been affected by the additional 150 mg NaHCO3/L in medium. By the 96-hour observation, pH had increased in some replicates including all control replicates by more than a 1.5 increments and exceeded 10, a pH level that results in dissolved CO2 levels that may not support algae density. The submitter provided pH levels only at test initiation and termination, which prevents determination of changes in pH by observation period. Control response was inadequate for the 96-hour study duration since the section-by-section coefficient of variation exceeded the recommended maximum (35%), but adequate if study duration is limited to the 72-hour observations. Based on reported pH levels for the 96-hour observation, EPA believes pH may have been a factor of poor control growth from 72 to 96 hours. Finally, according to the submitter provided analysis of the results using area under the curve calculations, all exposure concentrations resulted in a significantly different biomass when compared to control results and, thus, a NOEC could not be determined. Given the use of absorbance in a turbid test system to determine cell counts, high pH levels, insufficient control growth in the last 24-hour observation period, non-reporting of the pH levels at other observation periods, and the absence of a no effects exposure concentration, this study is unacceptable to characterize algae toxicity.

(5) A 96-hour marine diatom toxicity study was conducted with Armovis EHS (45% P-12-0264, ~21% ethanol, 15.3% water, ~12% propylene glycol, 4.4% sodium chloride, 2.2% CHOPSNa {CAS# 126-83-0], 1.1% fee amine, and 0.4% amine hydrochloride) under static testing conditions, but without GLP compliance. Replicates of P.tricornutum (the submitter does not provide the full scientific name) per concentration were exposed to nominal concentrations of 0 (dilution water control), 10, 32, 102.4, 327.7, or 1048.5 mg/L Armovis EHS. Analytical determination of test concentrations was not determined. Even though the submitter does not provide the full scientific name, EPA presumes the submitter tested the marine diatom Phaeodactylum tricornutum that has been characterized in literature as an atypical pinnate diatom and has not been recommended in either OECD or OPPTS guidelines. Six replicates were tested for each control and three replicates were tested for each test concentration. Test solutions appeared clear initially, but became increasingly turbid. As in the freshwater algae study, the submitter uses absorbance to determine cell density throughout the study, but also determines cell counts using a count chamber at study termination due to increasing turbidity of test solutions. The submitter indicates that adjustments are made to the raw data for absorbance to account for turbidity of solution, but does not provide the raw data for either the cell density determined by absorption or a count chamber. Without the raw data (referenced as Table 2 in the text but not included in the study report), EPA cannot establish whether use of two methods for determining cell density and calculating effect levels is valid, nor can EPA determine whether the submitter correctly determined that control growth was adequate. Additionally, use of a calibration curve is identified in the freshwater algae study, but not the saltwater study, so it is unclear whether the submitter addressed the appropriateness of absorption as a means to determine cell density of P.tricornutum. Over the course of the study, water temperature ranged from 23 ± 2°C, which was considered acceptable. The pH of the test system was provided in Table 1 according to the submitter, but Table 1 was not provided in the study report. Given pH difficulties in the freshwater algae study and the use of absorbance to determine cell density for at least some of the observation periods, EPA will reserve judgment on the study until missing information is provided.

The 96-hour acute fish (LC50>17 mg/L) and 48-hour acute daphnid (EC50 = 2.2 mg/L) studies were acceptable even though minor concerns were reported in the study summaries. Aquatic plant studies were considered unacceptable presently based on many deficiencies that made the studies difficult to interpret. For comparative purposes, predictions based on Amphoteric QSAR are 4.7, <5, ≤5, 0.5, ≤0.5, ≤0.5 mg/L for the acute fish LC50, acute daphnid LC50, algae EC50, chronic fish ChV, chronic daphnid ChV, and algae ChV endpoints. The acute CoC for P-12-0234 is derived by dividing the experimental 48-hour daphnid EC50 of 2.2 mg/L (2200 ppb) by an assessment factor of 5 yielding an acute CoC of 440 ppb for P-12-0264. The chronic CoC for P-12-0234 is derived by applying an acute-to-chronic ratio of 10 to the daphnid EC50 value resulting in a ChV of 0.22 mg/L (220 ppb), then dividing the predicted ChV by an assessment

factor of 10 yielding a chronic CoC of 22 ppb for P-12-0264.

Acute CoC = 440 ppb
Chronic CoC = 22 ppb

Ecotox Study Reviewer: K. Moran QA/QC: Amuel Kennedy

Ecotox Factors:

Assessment Factor:	10
Concern Concentration:	22

V. Summary of Exposures/Releases

Engineering Summary: P-12-0264

Exposures/Releases	**Release**	**Release**	**Release**
Scenario	**Use:** [redacted]	**Use:** [redacted]	**Use:** [redacted]
Sites	[redacted]	[redacted]	[redacted]
Media	[redacted]	[redacted]	[redacted]
Descriptor A	High End	Conservative	Output 2
Quantity A (kg/site/day)	[redacted]	[redacted]	[redacted]
Frequency A (day/year)	[redacted]	[redacted]	[redacted]
Descriptor B			
Quantity B (kg/site/day)			
Frequency B (day/year)			
From	[redacted]	[redacted]	[redacted]
Workers			
Exposure Type			

VI. Focus Decision and Rationale

Regulatory Actions

Regulatory Decision: PMN Drop Decision Date: 04/18/2012
Type of Decision:

Rationale: P-12-0264 was dropped from further review. Human health hazard concerns were low-moderate for inhalation exposure. Potential risks to workers were mitigated by negligible inhalation. Ecotoxicity hazard concerns were moderate based on EcoSARs predictions for amphoteric surfactants. Potential risks to the environment were low due to no releases to water are expected based on the use and the potential releases will be [redacted]. The chronic CoC of 22 ppb is based on submitted test data. The following EAB exposure based criteria were met: Surface Water Release After Treatment [redacted] and Total Release After Treatment ([redacted]). No CEB exposure based criteria were met. No exposure based testing was desired.

COC: Chronic – 22 ppb, Acute – 440 ppb

Summary of Exposures and Releases

Use

[redacted]

P2 Rec Comments:

Testing:

Final Recommended:

Health:
Eco:
Fate:
Other: